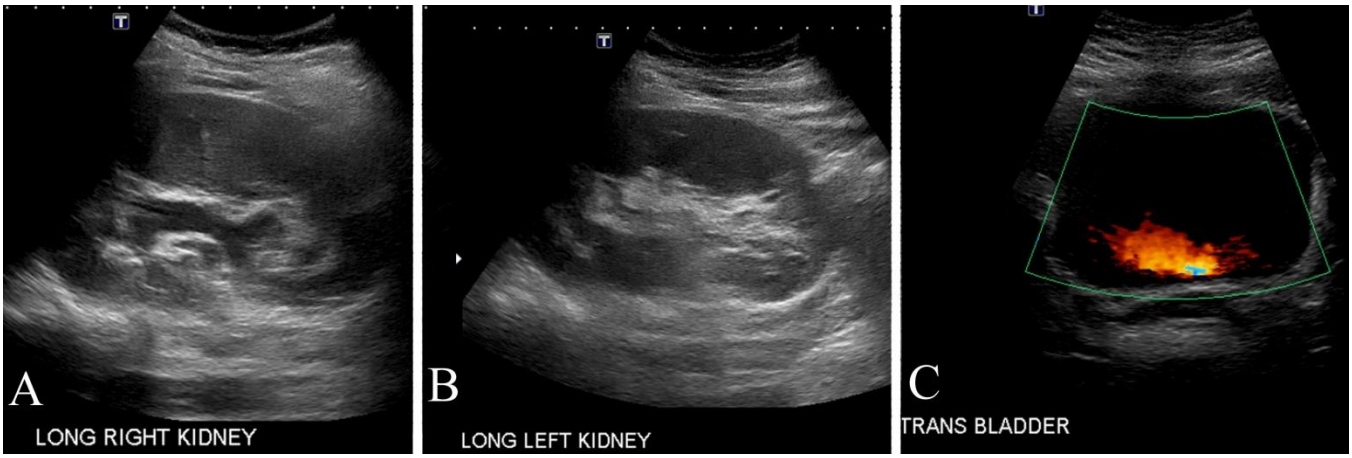
Donald L. Renfrew, MD
Radiology Associates of the Fox Valley, 333 N. Commercial Street, Suite 100, Neenah, WI 54956

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

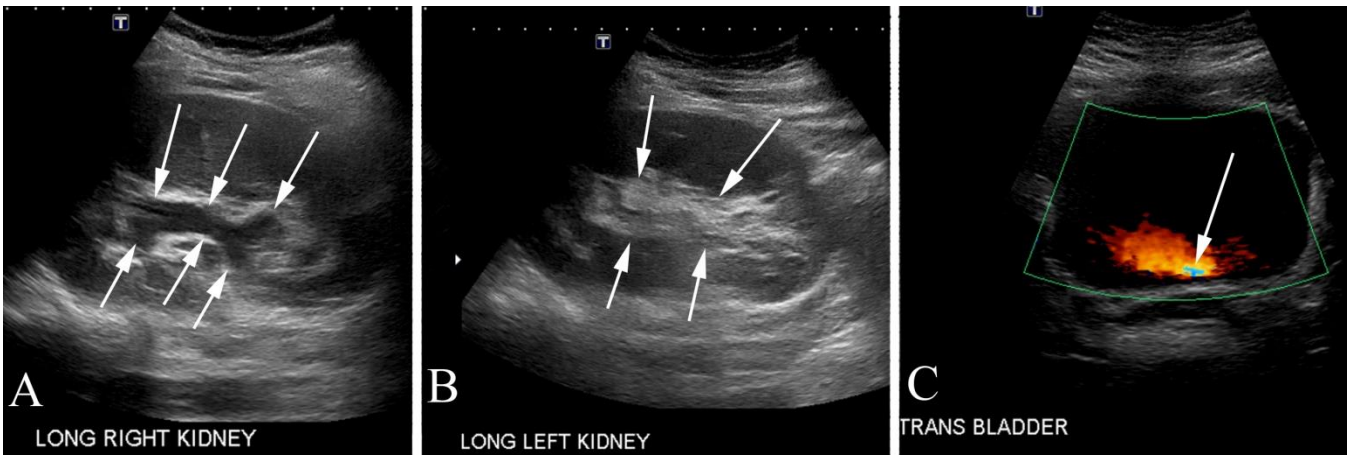
A 19 year old gravida 1, para 0 woman at 29 weeks gestation presents with recurrent symptoms of a urinary tract infection. Two weeks prior to the current visit, the patient underwent hospitalization because of a urinary tract infection. Her urine culture grew E. coli, and she was treated with appropriate antibiotics with improved symptoms (reduced fever and flank pain). At a follow-up visit two days after admission, the patient was doing well. She then completed a ten day course of oral antibiotics. Two days following the oral antibiotics, the day before the current visit, she developed fever, chills, and right flank pain and was very uncomfortable. The patient's temperature is 102. An imaging study was performed:



Which of the following additional imaging studies would be most helpful in further evaluation of the patient's symptoms?

(a) magnetic resonance (MR) imaging of the abdomen and pelvis
(b) plain film examination of the abdomen and pelvis
(c) unenhanced computed tomography (CT-KUB) of the abdomen and pelvis
(d) nuclear medicine renal scintigraphy with 99mTc-DTPA (Diethylene Triamine Pentacaetic Acid)

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION



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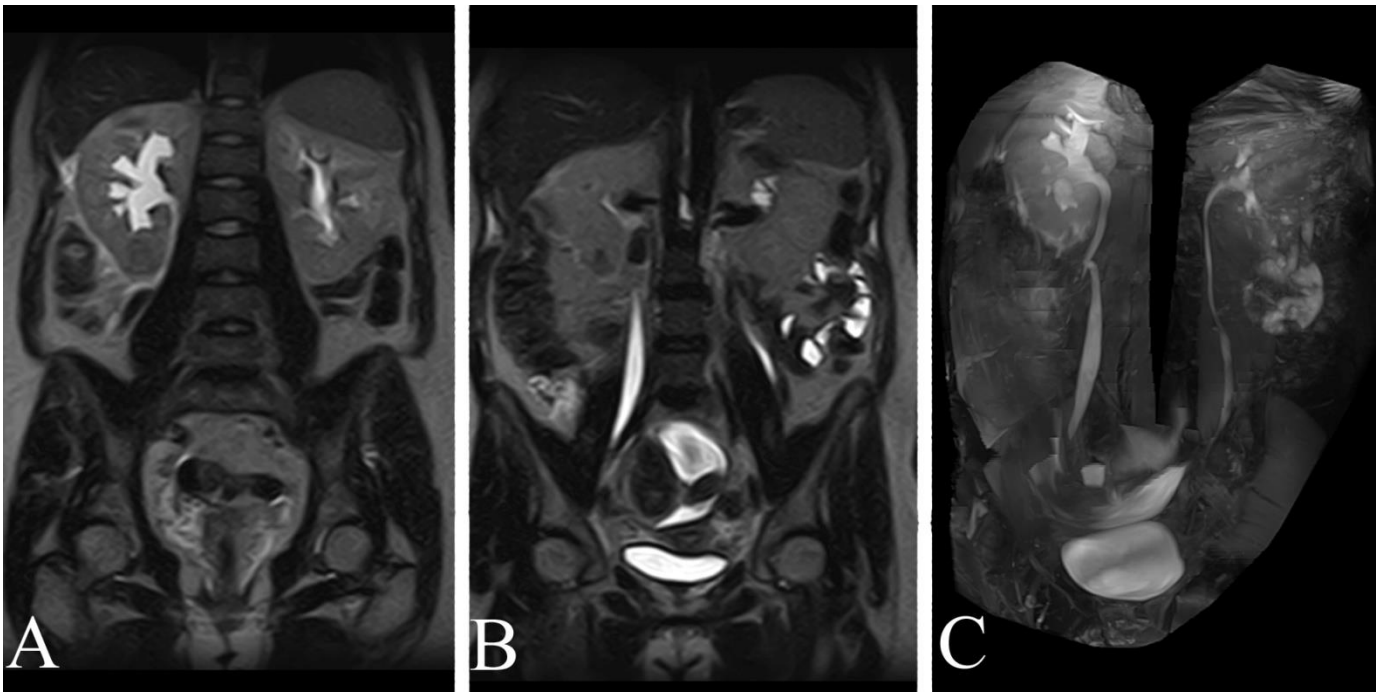
The initial imaging study in almost all pregnant patients with abdominal and pelvic pain is an ultrasound study, which was performed. This study demonstrates right hydronephrosis, with distension of the right collecting system (arrows in A), compared to the collapsed left collecting system where there is echogenic renal sinus fat without hydronephrosis (arrows in B). Bladder imaging shows a left ureteral "jet" (arrow), but no right ureteral jet was seen despite prolonged scanning. The main issue in this patient is whether the right renal distension represents gestational hydronephrosis, or, given the patient's recurrent infections and pain, whether there is a stone in the distal ureter. While no stone was identified on the ultrasound study, the lack of a ureteral jet was of concern. Additional imaging of the pregnant patient is an area of ongoing controversy which continues to evolve, and such imaging is generally best undertaken after consultation between the patient's care provider (typically an obstetrician) and the radiologist. With respect to imaging of pregnancy patients with symptoms, as noted in RQW106 Pregnant Patient with Symptoms I 12-29-2012, CT scans are typically avoided because of concerns regarding exposure to ionizing radiation, and contrast material is avoided because of concerns regarding adverse effects on fetal thyroid function (for iodinated contrast used for CT studies) and possible teratogenic effects (for gadolinium based contrast used for MR studies). This is a challenging and evolving area and there is local variation in practice, but the best answer is probably (a), unenhanced MR of the abdomen and pelvis, since this involves neither ionizing radiation or contrast injection. Therefore, (a) is the correct answer.

IMAGING STUDY AND QUESTIONS

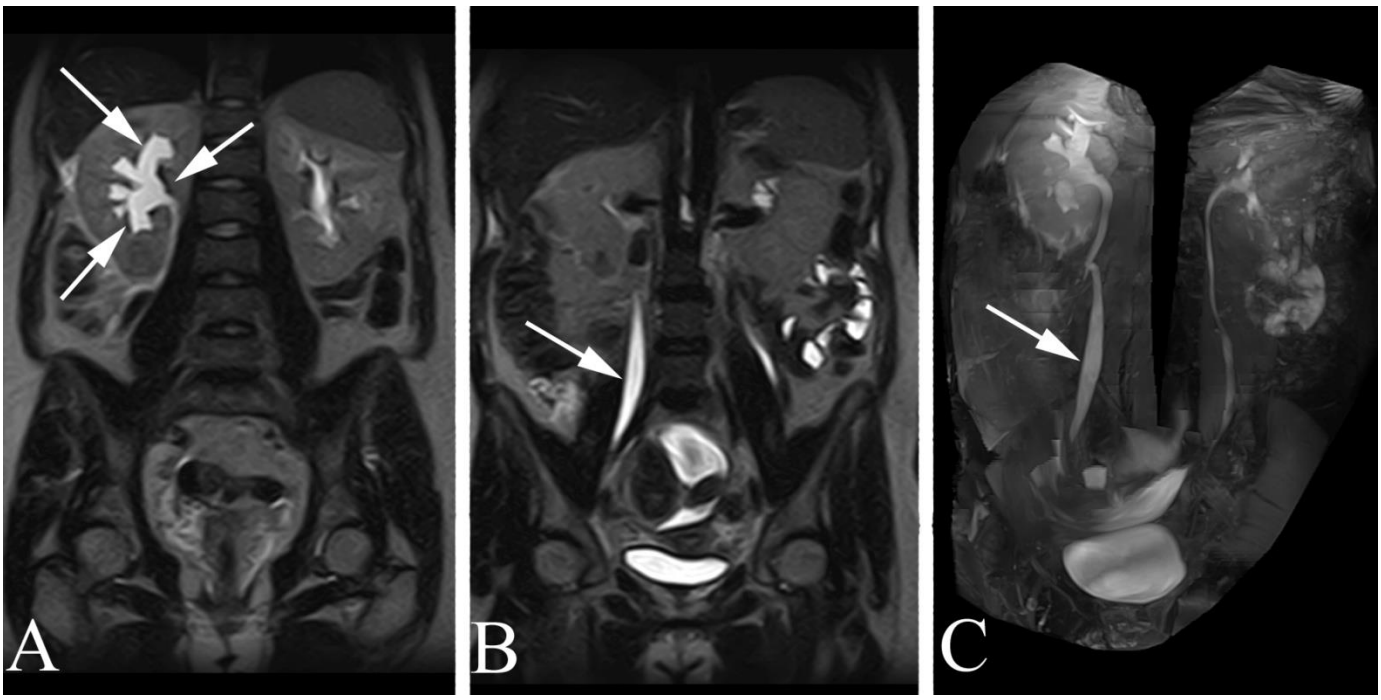
An additional imaging study was performed:



Imaging questions:

1) What type of study is shown?
2) Are there any abnormalities?
3) What is the most likely diagnosis?
4) What is the next step in management?

IMAGING STUDY QUESTIONS AND ANSWER



Imaging questions:

1) What type of study is shown? Unenhanced magnetic resonance imaging of the abdomen and pelvis.
2) Are there any abnormalities? Yes. There is distension of the right renal pelvis and collecting system (arrows in A) and in the right ureter (arrows in B and C).
3) What is the most likely diagnosis? Given the smooth tapering of the distal ureter and the absence of intra-ureteral filling defect, gestational hydronephrosis is more likely than hydronephrosis secondary to ureteral obstruction from stone disease.
4) What is the next step in management? Treatment for pyelonephritis as necessary.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

The patient was under the care of an obstetrician, and in addition a urologist was consulted for further evaluation of the patient's recurrent urinary tract infections and pyelonephritis. After the MR urogram showed findings of gestational hydronephrosis the patient was treated with oral antibiotics for prophylaxis of further urinary tract infections, with plans for further work-up of the urinary tract if infections persisted following delivery.

SUMMARY

Presenting symptoms: The patient presented was pregnant but also had recurrent urinary tract infections (with fever, flank pain, and pyuria).
Imaging work-up: Imaging for young women with recurrent urinary tract infections depends on several factors, including whether the patient is pregnant. In *pregnant* patients, renal ultrasound is always the first imaging study of choice, to evaluate the degree of hydronephrosis, to document bilateral ureteral jets (and thus exclude obstructing stones within the ureter), and (on occasion) to directly visualize stones in the collecting system or ureter. In *non-pregnant* patients with recurrent urinary tract infections where renal stone disease needs to be excluded, an unenhanced CT of the abdomen and pelvis (the so-called CT-KUB) is typically obtained (see RQW002 Flank Pain 01-08-11), with a contrast-enhanced study to follow if the CT-KUB is not completely diagnostic.
Establishing the diagnosis: Distension of the renal collecting system and ureters are common features of pregnancy, and occur more frequently on the right. When pregnant patients with pyuria develop flank pain and fever, the diagnosis of pyelonephritis usually follows, and may be treated with intravenous antibiotis. In this case, findings on ultrasound including relatively asymmetric hydronephrosis and lack of a right ureteral jet, along with recurrent infections, raised concern for nephrolithiasis causing flank pain and recurrent infections. The MR urogram showed no findings of nephrolithiasis, however. In addition, the patient did not pass any stones, nor were any crystals found in her urine, so the presumed diagnosis is gestational hydronephrosis complicated by recurrent urinary tract infections.
Take-home message: The initial imaging study of choice for virtually all pregnant patients with urinary tract infection and symptoms of pyelonephritis is a renal ultrasound. This will allow documentation of the degree of hydronephrosis, exclude pyonephrosis and renal abscess, and hopefully document bilateral ureteral jets. Because of the rapid and ongoing evolution of imaging with respect to pregnant patients with symptoms, ordering of additional imaging such as plain films, CT, or MR is generally best left to an obstetrician, who will often order such studies only after discussion of the case with a urologist, a radiologist, or both.

FURTHER READING

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Wang PI, Chong ST, Kielar AZ et al. Imaging of pregnant and lactating patients: Part1, evidence-based review and recommendations. AJR 2012;198:778-784.

Wang PI, Chong ST, Kielar AZ et al. Imaging of pregnant and lactating patients: Part 2, evidence-based review and recommendations. AJR 2012;198:785-792.